

# It Takes a Spark!

## grok STEM Conference

academy

Early bird  
registration  
closes 23rd Aug

BOOK NOW or  
HOLD PLACES

Wednesday, 20 September 2023 | WA

### Theme: STEM by Nature

The 2023 conference is to highlight how STEM is natural and related to all disciplines and connected to creating renewable, sustainable and interconnected world. This can include workshops covering any topic of science, the arts, food and fibre, energy, environmental, biological, space, first nations, learning, etc).

#### Teacher PD workshops from leading STEM experts, teachers and students on topics as diverse as

- >> First Steps to designing a well-planned STEM program
- >> How electric vehicle racing can engage your students in STEM
- >> Engage Future Data Scientists with AusEarthEd and Pawsey Supercomputing Centre
- >> Using AI tools - the good, the bad and the ugly
- >> SpaceDraft: unleashing student creativity
- >> Teacher Networking and STEM Pathways session

#### Hands-on sessions for students and teachers, examples...

- >> LEGO Algorithmics
- >> What could we do with dinosaur DNA?
- >> Man or Machine: How does Artificial Intelligence work?
- >> Fish Care and Sustainable Biology
- >> Big, Bigger, Biggest, Biggest - How can I visualise BIG data?
- >> Emergency Management: Managing an Emergency
- >> STEM is cool!
- >> Virtual and Augmented Reality
- >> STEM EXPO activities
  - >> Remote Piloting
  - >> Solar Car Challenge
  - >> Grok Academy @ the STEM Expo
  - >> Future Focused DigiDesign
  - >> Drones: Supporting the Australian Environment
  - >> WA Organic and Isotope Geochemistry Centre
  - >> Tackling the problem of food wastage
  - >> Greening PC: Regenerating Nature and Increasing Canopy Coverage for a Sustainable Future



#### Problem Solver sessions: design challenges taking students and teachers through the design process including...

- >> Dark Skies
- >> Are mammoth meatballs a solution or a problem?
- >> Minecraft Sustainable Zoo Challenge
- >> Where the wind blows!
- >> Outdoor Solutions
- >> Crash Course in Micro:Bit
- >> Binar 'bots: Communications and Space
- >> World building: What does a school of the future look like?

...read on for full programme

#### Outstanding Keynote Speakers



##### DR JESSICA BUCK

Telethon Kids Institute  
UWA Researcher  
Superstar of STEM

Jessica is an early career cancer researcher specialising in finding better treatments for kids with brain cancer. Brain cancer kills more Australian children than any other disease. Since radiotherapy is an important part of treatment for childhood brain cancer, Jessica works to find new combinations of drugs that increase the effectiveness of radiotherapy.

As a Kamilaroi woman, Jessica also aims to increase the number of young Aboriginal women working in, studying, and enjoying STEM. She regularly hosts students and interns, and is involved in mentoring through the Aurora Project's High School Program.



##### RENAE SAYERS

Space Science and Technology Centre, School of Earth and Planetary Sciences, Curtin University

Renae Sayers is the Deputy Director of the Space Science and Technology Centre at Curtin University and her goal is to help WA fall in love with space. Not just for the inspiration (although that can literally change lives), but for the challenge, the innovation potential and the incredible impact it has on our world.

It all started with an email to NASA as a 16-year-old that kick-started her journey through a degree in Astrophysics, to running away to join a science circus and then onward to a career in STEM engagement across the globe.

These days she keeps busy with the Binar Space Program (BIN-nar, Noongar for "fireball" or shooting star) which launched WA's first home grown spacecraft in 2021 and is on the path to exploring our Moon, as our scientists and engineers come together to unravel the mysteries of the origins and evolution of our solar system. Keen to make space in service of others, Renae spearheads BinarX - the outreach program putting space exploration in the hands of high schoolers and student-designed and built payloads on-orbit with the Binar spacecraft.

PROGRAMME: [spark-educonferences.com.au/western-australia-2023](https://spark-educonferences.com.au/western-australia-2023)

#### Contact

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#### Host School



#### Conference Coordinator



## First Steps to designing a well-planned STEM program



### Dr Adrian Bertolini - Intuyu Consulting / Spark STEM Conferences

Schools often begin enacting STEM by introducing STEM clubs or activities at lunchtime or after school, having STEM specialist subjects and maker spaces, or even participating in STEM competitions. These approaches are all great ways to begin laying the groundwork for a sustainable STEM program. The challenge for many schools will be moving STEM from these groundwork laying activities to an authentic STEM program that delivers the desired outcomes. In this session Adrian will outline the thinking and planning that primary and secondary schools will need to do if they are going to design a whole school STEM program that delivers. This includes discussing creating a design brief for a STEM program, mindset and capabilities planning, learning ladders, and curriculum mapping approaches. Templates for planning will be provided.

**School / teacher stages: Beginning, Next Step & Extending**  
**Suitable for Primary Teachers**

## Using AI tools - the good, the bad and the ugly



### Grok Academy

AI tools are increasingly making themselves known in education. Grammarly, Co-pilot, GPT3 are now being used by students. How can teachers use it to make learning more meaningful and support their students to navigate this space? How can teachers be equipped to navigate this fast changing landscape? Join us as we demonstrate how AI tools can be used effectively in teaching and learning and discuss the potential pitfalls and how to avoid them.

**School / teacher stages: Beginning, Next Step & Extending**  
**Suitable for Primary & Secondary Teachers - BYO Laptop**

## How electric vehicle racing can engage your students in STEM

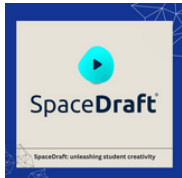


### Clay Woolcock, Comet Bay College

WA's eV Challenge has been a premier STEM competition for over 20 years. This Teacher Mini-Master Class will show how this competition can be used to engage students from all ability levels in a hands-on STEM project that is well established and has direct links to the technology of electric vehicles. Teachers will be walked through the process of designing, building, racing and continual development of an electric vehicle which can race in the eV Challenge competition.

**School / teacher stages: Beginning, Next Step & Extending**  
**Suitable for Secondary Teachers - BYO phones or tablet to take photos**

## SpaceDraft: unleashing student creativity



### SpaceDraft

SpaceDraft is an online learning tool designed to help students develop skills in independent or collaborative strategy and scenario building to determine possible solutions. As an easy-to-use web-based application, SpaceDraft can be employed by students in primary and secondary schools to foster collaboration, creativity, critical thinking and communication. SpaceDraft has broad application across the curriculum: creative and performing arts, humanities, science and mathematics and physical education and sports. It has been endorsed by SCASA and the WA Department of Education. In this workshop, the SpaceDraft team will teach you how to create SpaceDraft templates to turn any assessment into a visual and exciting gamified learning experience for students.

**Suitable for Primary & Secondary Teachers**

## Engage Future Data Scientists with AusEarthEd and Pawsey Supercomputing Centre



### Jo Watkins, Australian Earth Science Education and Ann Backhaus, Pawsey Supercomputing Research Centre

Explore the resources available to you, through Pawsey, to engage your students with real data that students create. From collection, interpretation, analysis, application and communication the AusEarthEd and Pawsey teams will walk you through the many free resources available for use in your classroom, stopping to have a go at some of our favourites. With real data sets and engaging curriculum-linked activities around sleep science and urban canopy cover, there is so much to explore!

**School / teacher stages: Beginning, Next Step & Extending**  
**Suitable for Secondary Teachers**

## CME Digital Technologies Challenge



### The Chamber of Minerals & Energy of Western Australia

Engaging students in digital technologies has often been challenging because, in the past, many DT activities and lessons have been quite dry and artificial. In this teacher session you will have the opportunity to experience the CME Digital Technologies Challenge program. The program provides students with authentic, engaging, challenging, and rich activities co-designed by industry and technical experts, demonstrating practical applications of Automation and Data Science uses within the industry, including careers and entry pathways. Incorporating online and offline activities, students can experience programming and coding through utilising Bee-bots, micro:bits, micro:cars, Blockly and Python through the GROK Academy.

**Suitable for Primary & Secondary Teachers**  
**Teachers to bring a device and have registered with Grok Academy prior to the workshop.**

## DigiDesign Mini-workshops - Teacher and/or Student

### What could we do with dinosaur DNA?



### Amanda Rogers, Cultivating Curiosity

It is likely we have all seen at least one of the Jurassic Park movies. Dinosaurs, which have been genetically engineered from ancient DNA, go on a rampage and destroy a theme park. If you had the chance ... what could you do with dinosaur DNA? In this workshop you will participate in a community of inquiry using the Philosophy in Schools approach to explore the ethical dilemma posed by dinosaur DNA and possibly bringing them back to life. Even better Lego will be involved!

**Suitable for Year 4 to 6 students and/or teacher**

## LEGO Algorithmics



### Grok Academy

An algorithm is a procedure or a list of step by step instructions that can be used to solve a problem or deliver a particular outcome. When creating STEM solutions it is vital that you are able to accurately communicate your ideas and the actions you want to be taken by others. In this workshop you will be introduced to the ideas of problem decomposition and accurate documentation. You will have the opportunity to build a small LEGO 'thing' and then attempt to document how another person would build the same 'thing'.

**Suitable for Year 4 to 6 students and/or teacher**



## Big, Bigger, Biggest, Biggest – How can I visualise BIG data?



**Ann Backhaus, Pawsey Supercomputing Research Centre and Australian Data Science Education Institute (ADSEI)**

Only forty years ago we marveled at how powerful computers were as they came into our homes. These days we use computers and networks which are over a trillion times faster and the data sets they are handling are truly mind-boggling BIG! And this BIG DATA is growing exponentially as we analyse our world, our genes, our universe, and more. Join us to creatively reimagine BIG - our big world, galaxy, universe, and Australia's biggest (and greenest) public research supercomputer – Setonix, which does BIG every day. Leave with ideas on how to visualise BIG, and how to bring your friends and family in on this BIG discussion!

**Suitable for Year 7 to 10 students and/or teacher**

## Emergency Management: Managing an Emergency



**Institute of Public Works Engineering Australasia – WA**

WA has had its fair share of emergencies and disasters in recent times - bushfires, storms, cyclones, floods, pandemic, etc. Emergencies can strike at anytime, anywhere and often without warning. Engineers and public organisations need to respond quickly to protect people and infrastructure. In this fascinating workshop IPWEA WA & Young IPWEA will present a mock emergency situation using real life emergency issues. You will work collaboratively in teams to come up with solutions to resolve various issues. Learn how Engineers make decisions, deal with ethical conundrums and respond to emergency situations.

**Suitable for Year 7 to 10 students and/or teacher**

## Robogals EV3 Engineering/Programming Session



**Robogals Perth**

Robogals is a student run organisation that aims to inspire and empower young women to consider studying engineering and related fields. In this workshop, you will learn to program the actions of robots, gradually increasing in difficulty and complexity. The movements will range from simple traversal, to a more complex use of sensors, "if" statements and loops. This will be very hands-on and you will be encouraged to play around with the workshop material to learn and understand how the code functions through the robots' actions.

**Suitable for Year 4 to 8 students and/or teacher**

## Man or Machine: How does Artificial Intelligence work?



**Grok Academy**

Is ChatGPT actually sentient? How can Scribble Diffusion turn your sketch into a realistic photo?

Join us as we lift the lid on how Artificial Intelligence works and decide for yourself what opportunities there are for how we use it in the future and where there is still room for growth.

**Suitable for Year 5 to 8 students and/or teacher**

## Developing a Water Efficiency Warning System



**Water Corporation**

With the increasing impact of climate change on our environment it is becoming more and more important that we manage our water usage well. Research on water efficiency has shown that it is more cost effective in Perth to improve water efficiency than to invest in alternative water supplies. In fact, community members who know about water management are more likely to adopt water-saving behaviours. In this workshop you will be designing a program in 'Scratch' block code using provided water use data of an average Perth household. The program will return a message to the householder that informs the user of the efficiency of their water usage and the ways they can reduce their water usage and save money!

**Suitable for Year 6 to 10 students and/or teacher**

## Fish Care and Sustainable Biology



**Nicholas Rust and Katrina Lawrence, Peter Carnley Anglican Community School**

Aquaponics is a method of growing fish and plants in a closed water system. Fish waste provides the plants' nutrients, while the plants purify the water to help keep the fish healthy. Aquaponics uses up to 90% less water than traditional agriculture, plants grow much faster, and also reduces pollutants coming from the use of chemicals and pesticides. Aquaponics has the potential to put food production into the hands of the people who experience food insecurity, giving them autonomy in controlling their access to safe and nutritious produce. In this hands-on session you will explore building and maintaining a small-scale aquaponics system in your home and/or school! Come and see the aquaponics facility and attached garden at the host school.

**Suitable for Year 6 to 8 students and/or teacher**

## Who did it?



**GATE Year 10 students, Northam Senior Secondary**

Forensic investigation is the gathering and analysis of all crime-related physical evidence and the use of the scientific method to come to a conclusion about the cause of an event.

In this hands-on workshop you will be the forensic scientist who will be examining the evidence of a nefarious deed and identifying the cause of death. Can you figure out who did it?

**Suitable for Year 7 to 10 students and/or teacher**

## Building a Sustainable City



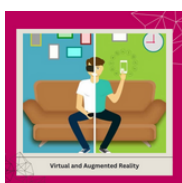
**Students from Attadale Primary School**

Why are sustainable buildings saving our planet? What is sustainable design? What materials are used to build a sustainable building?

In this workshop you will discover how you can design a city with sustainably built buildings, incorporating Microbit components such as street lamps, traffic lights that would use renewable energy, and autonomous electric smart cars that don't pollute our environment.

**Suitable for Year 4 to 6 students and/or teacher**

## Virtual and Augmented Reality



**Lindsay Hall, Dale Christian School**

Virtual and Augmented reality (VR / AR) is increasingly being used in construction, agriculture, mining, tourism, and even learning. With VR we can do site visits to historical places and hard to reach areas, see designs in 3D before they are built, support surgery, and much more. AR is used to improve manufacturing, guide and inform tourists, assist in healthcare, and much more.

In this workshop you will have a quick tour of Virtual and Augmented Reality through CoSpaces. Placing, orienting, and animating 3D assets to create interactive, immersive virtual environments for a multitude of purposes

**Suitable for Year 4 to 8 students and/or teacher**



## Fibonacci in Nature



### Cara Barrett, Peter Carnley Anglican Community School

The Fibonacci sequence is one of the most famous formulas in mathematics. Each number in the sequence is the sum of the two numbers that precede it. So, the sequence goes: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, and so on. It's been called "nature's secret code," and "nature's universal rule." This famous pattern shows up everywhere in nature including flowers, pinecones, hurricanes, and even huge spiral galaxies in space. In this workshop you will have the opportunity to recreate the Fibonacci spiral as seen in nature. Learn the beauty of mathematics and how it is all around us in the world!

**Suitable for Year 7 to 10 students and/or teacher**

## STEM is cool!



### Seema Shorey and students, Grovelands Primary School

Nature offers us great opportunities to learn about the concepts of STEM. In many cases, understanding how nature has come up with solutions allows us to develop the skills to understand science, adapt to the latest technology, and engineer new solutions to solve problems of all sizes. In this session run by Groveland Primary, you will participate in a range of hands-on experiments that will show you how you can learn science, technology, engineering, and mathematics from the world around you!

**Suitable for Year 4 to 6 students and/or teacher**

## From Fast Fashion to Fantastic Bags



### Natascha Clark and Vanessa Krollig, Peter Carnley Anglican Community School

Fast fashion is a term used to describe the clothing industry's model of mass-producing clothes at low cost with high-speed turnaround times to replicate the latest streetwear and fashion trends. Not only does the fashion industry produce about 10 percent of annual global carbon emissions, the throwaways fill up our rubbish tips.

In this hands-on workshop you will learn how to create shopping bags out of recycled t-shirts, being part of the solution rather than the problem!

**Suitable for Year 5 to 9 students and/or teacher**

## Track Masters



### Railway Technical Society of Australasia

In this workshop you will take on the role of railway engineers. You will be tasked with designing and building a functional train track system. The main objective of this challenge is to design a train track layout, considering factors like the train's speed, safety, and smooth travel, that allows a model train to travel safely and efficiently. Can you balance the design elements to create the most effective solution?

**Suitable for Year 6 to 8 students and/or teacher**

## Marshmallow Skyscrapers

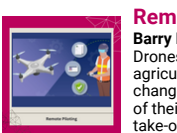


### Engineering Institute of Technology

Design thinking and problem solving are at the heart of being an engineer. In this workshop you will be challenged to design and construct the tallest freestanding tower using marshmallows and uncooked spaghetti. Through creative design and problem-solving, learn about stability, structure, and teamwork while having fun with this hands-on, marshmallow-filled adventure!

**Suitable for Year 6 to 8 students and/or teacher**

## STEM Expo: hands-on activity area - Student and / or Teacher (selected as one workshop, activities may not run in both rotations)



### Remote Piloting

**Barry Hutton, South Metropolitan TAFE**

Drones are used increasingly by organisations such as energy companies, agriculture and mines to inspect assets that are difficult to access, monitor and map changes in the condition of structures or terrain and provide new aerial perspectives of their assets. In this STEM Expo activity you will experience how to make a drone take-off, maneuver through a 'gate' and land. Along the way you'll learn about the human and technical factors needed to become a remote pilot.

**Suitable for Year 8 to 10**



### WA Organic and Isotope Geochemistry Centre

**Faculty of Science and Engineering, Curtin University**

The WA Organic and Isotope Geochemistry Centre at Curtin University is a world research leader in the study of long extinct animals, prehistoric ecosystems, microbial life, the effect of microplastics on the environment and much more! Visit the WA-OIGC expo booth where you can learn all about ancient life and paleo-environments. With fossil samples that are hundreds of millions of years old and samples from the crater of the dinosaur killing asteroid, there are plenty of things to have a look at. Get your craft on and also have a go at making your very own glass marble fossil that you can take home.

**Suitable for Year 4 to 10**



### A day in the life of an Enviro – hands on experience

**Melissa Paxman, Roy Hill**

Ever wondered what an Environmental Scientist's job involves for a mining company? Join our Enviro team at site in this immersive virtual reality journey of our Pilbara operations to learn about the importance of Roy Hill's environmental program in the successful operation of a world class iron ore mine. Experience how STEM skills are used in a real-life job role to complete daily tasks and the embedded work ready skills required such as teamwork, communication, problem solving and critical thinking skills. Learn how Enviro's use technology, chemistry, biological sciences, environment, geography and maths skills to work in such a diverse and innovative industry. You will also get the opportunity to complete a water testing activity with one of our Enviro's at the STEM expo and have the opportunity to ask them questions.

**Suitable for Year 7 to 10**



### Chevron Energy

**Haura Hussaini, Chevron Australia**

Chevron has been present in Australia for more than 60 years and operates two of Australia's largest natural gas developments – the Gorgon and Wheatstone Projects, and manages and operates several other Australian ventures. They are a major employer in WA as well as forming a number of strategic and community partnerships to empower local communities.

In this STEM activity you'll have the opportunity to participate in a range of activities that will show you the process of producing energy and the technologies that are used. Come and engage in the VR experience!

**Suitable for Year 4 to 10**



### Grok Academy @ the STEM Expo

**Grok Academy**

How do we secure information on the internet?  
What information is safe to share online?  
How do computer programs work?

Discover the answers to these questions and more by participating in a range of short unplugged activities running across the day:

- Cybersecurity Cards: sort through cards about various personal information and determine if it is safe to share online or not
- Cryptography: use different cyphers to encrypt and decrypt messages to understand the importance of encryption
- Decision Trees: classify animals using a decision tree
- Algorithmic Treasure Hunt: complete the activities to find the prize!

**Suitable for Year 4 to 10**



### STEM Outreach Program (AusEarthEd)

**Jo Watkins and Sally Budge, Australian Earth Science Education**

Showcasing AusEarthEd's free online earth science resources for teachers and students including hands-on activities, videos, apps and differentiated STEM projects. We will also be demonstrating the use of Ozobots in STEM problem solving through a short programming activity using coloured pens

**Suitable for Year 4 to 10**



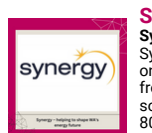
### Emerging Energies

**Clough Group**

Clough is a pioneering project delivery company that harnesses innovative engineering and construction solutions to improve peoples' lives today and tomorrow. With a workforce of over 3,000 people across Australia and Asia Pacific, Clough's people are committed to delivering exceptional projects for its industries and communities, as a partner for a sustainable future.

Clough believes STEM subjects open the door to exciting careers. Come and have a chat with the Clough team and take part in a fun emerging energies activity!

**Suitable for Year 4 to 10**



### Synergy – helping to shape WA's energy future

**Synergy**

Synergy is WA's largest electricity generator and retailer of electricity with more than one million residential, business and industry customers. Our customer base extends from Kalbarri in the north, east to Kalgoorlie and south to Albany. Our energy generation sources are changing and with the State Government's target to reduce emissions by 80% of the 2020 levels by 2023, we are on a journey to generate more electricity from renewable sources. Visit the Synergy stand to discover how we're innovating to make electricity generation more sustainable.

- Learn about our graduate program and exciting STEM careers in the energy industry.
- Find out about our energy pilots and get involved in our engaging school programs.

**Suitable for Year 6 to 10**

## STEM Expo: hands-on activity area - Student and / or Teacher (selected as one workshop, activities may not run in both rotations)



### Drone Experience

#### Pakronics

Drones are used for a wide range of activities including; search and rescue, surveillance, traffic monitoring, firefighting, photography and videography as well being used increasingly by organisations such as energy companies, agriculture and mines to inspect their assets. Drones are also great in STEAM education in learning about programming, design, robotics, and more.

In this STEAM Expo activity you will have an opportunity to not only fly a drone but program one for an autonomous activity.

**Suitable for Year 4 to 10**



### Augmented Reality Live

#### Worley

Augmented Reality (AR) software allows 3D visualization, collaboration, and field to office communication across all stages of construction, such as design review, facility management, and more. Utilizing augmented live technology, engineers are now able to visit the site and experience their design in the field virtually.

Communication and collaboration in virtual environments have the power to significantly reduce emissions within all facets of business operation. Now, more than ever, it is vital that businesses choose to actively work towards improving their environmental footprint and for Worley specifically to strive to deliver a more sustainable world.

**Suitable for Year 4 to 10**



### CME Digital Technologies Program

#### The Chamber of Minerals & Energy of WA

The Chamber of Minerals and Energy Digital Technologies Program helps schools deliver fun and engaging educational activities aligned with the Australian and WA Digital Technologies curriculum. In this expo session attendees will experience a sample of the program including the use of BeeBots and a demonstration of the Micro:Car Challenge for students to block code instructions and move across a map. Come along, have a go, and talk about how the program can support your school!

**Suitable for Year 4 to 10**



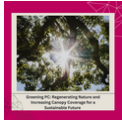
### Phased Array Ultrasonic Inspection

#### Richard Stocker, EnerMech Pty Ltd

Non-destructive testing (NDT) is used in the science and technology industry to evaluate the properties of a material, component or system without causing damage. This is critically important so that structural defects can be detected before there is a catastrophic failure.

Phased array ultrasonic technology is used increasingly by EnerMech to inspect welds and nozzles on a variety of assets in the Oil & Gas, Mining, Power and Defence Sectors. Come along and use the ultrasonic detector probes to find defects in welds and learn how this technology is used to keep us all safe!

**Suitable for Year 4 to 10**



### Greening PC: Regenerating Nature and Increasing Canopy Coverage for a Sustainable Future

#### Students from Perth College

Year 9 Perth College students have been undertaking a project aimed at transforming an area at the college to increase tree canopy, regenerate nature and enable biodiversity to thrive. There is significant research showing the benefits of trees and green spaces in urban environments – especially in educational settings. Through a collaborative activity, you will have the opportunity to design your own school nature regeneration and tree canopy plans, considering factors like space availability and species selection. The Expo will also provide a platform for sharing lessons and experiences from the school's transformation project. Students and teachers will leave with practical knowledge and inspiration to implement similar initiatives in their own schools.

**Suitable for Year 4 to 10**



### Solar Car Challenge

#### TIDES students, Peter Carnley Anglican Community School

This year a team of Year 8 TIDES students took on the Synergy Schools Solar Car Challenge. This challenge required them to understand, in practical terms, how solar panels operate, the influence of angles and alignment of the solar panel to voltage output, the relationships between all the physical elements needed to produce an effective mechanical output, and then they needed to construct a working solar-powered and race-ready car.

Come along and join our team to learn about how they approached the challenge and the various principles they learned along the way. Even test drive one of the cars!

**Suitable for Year 4 to 10**



### Future Focused DigiDesign

#### Harrisdale Primary School

Design Thinking is an approach to creative problem-solving that aims to bring together what is desirable from a human point of view, with what is technologically feasible and economically viable.

In this STEAM Expo activity, the students from Harrisdale Primary will share a short video with you about a UN Sustainability Goal. You will then have to design a solution choosing from some available resources with coaching and guidance from the students. What can you create?

**Suitable for Year 4 to 6**



### Tackling the problem of food wastage

#### Australian Christian College, Darling Downs

Food waste is a major problem in Australia. Each year we waste around 7.6 million tonnes of food across the supply and consumption chain – this wastage equals about 312kg per person, accounts for approximately 3% of Australia's annual greenhouse gas emissions, and it costs the economy around \$36.6 billion each year.

In this expo activity you will discover how our GATE students identified a sustainable and effective method to tackle the problem of food wastage. The students will showcase a 3D model of a freezer they have designed plus a simulation using KodeKlix, Blockly PICAXE and a heat sensor. Come along, ask questions, and learn more about the topic and what you can do around this massive problem!

**Suitable for Year 4 to 6**



### Drones: Supporting the Australian Environment

#### Al-Ameen College

Drones are used in various ways to support environmental efforts in Australia including: bushfire monitoring, wildlife conservation, marine and coastal research, marine debris and pollution surveillance and Indigenous land management.

In this STEAM activity you will have the opportunity to not only fly a drone but program one for an autonomous activity to demonstrate its use in the environment.

**Suitable for Year 4 to 10**

## Problem Solvers Design Challenge - Student and Teacher

Each session has a different real life design or STEAM challenge to solve aimed at Year 4 to 10 students. You will be posed with a real life design challenge and lead through the design process to ideate and present possible solutions.



### Crash Course in Micro:Bit

#### Grok Academy

Micro:bits are a great introduction to physical computing. This problem solver session introduces you to the BBC micro:bit and how to program it. You will learn about inputs and outputs and use basic programming skills to solve a variety of different challenges such as making a dice game!

**Suitable for Year 4 to 6 students and teachers**



### Dark Skies

#### Courtney Press, Bloom

People all over the world are living under the nighttime glow of artificial light, and it is causing big problems for space research, ecosystems and human health. Studies show that light pollution is also impacting animal behaviors, such as migration patterns, wake-sleep habits, and habitat formation. In this design thinking workshop participants will dive into the problem of light pollution and work collaboratively to define the problem, ideate innovative solutions, create a prototype and pitch their solution to an audience.

**Suitable for Year 7 to 10 students and teachers**



### Are mammoth meatballs a solution or a problem?

#### Amanda Rogers, Cultivating Curiosity

The extinct woolly mammoth has returned—as a meatball. Recently, an Australian cultured meat start-up revealed a sphere of lab-grown meat, produced with a DNA sequence from the elephant-like mammal. But are mammoth meatballs a solution or a problem?

In this workshop you will participate in a community of inquiry using the Philosophy in Schools approach to explore the ethical dilemma posed by making meatballs out of extinct creatures. Even better Lego will be involved!

**Suitable for Year 7 to 10 students and teachers**



### Where the wind blows!

#### Curtin Engineers Without Borders

The supply of reliable, efficient and affordable renewable energy is an immense challenge facing current and future generations. One of the possible solutions to sustainably and reliably powering the world is using wind energy. Wind turbines are structures that convert wind power into rotational energy by means of vanes called sails or blades. In this design challenge you will design, build and test your own set of wind turbine blades to make the most efficient design possible. Along the way you will learn about engineering, sustainability and how to apply critical thinking to real-world problems.

**Suitable for Year 4 to 8 students and teachers**



Each session has a different real life design or STEAM challenge to solve aimed at Year 4 to 10 students. You will be posed with a real life design challenge and lead through the design process to ideate and present possible solutions.



## Outdoor Solutions

**Rebecca Moore, South Metro PEAC**

You and all young people will be the leaders and architects of tomorrow. That's why you will need a process you can internalise to face challenges and problems that have yet to arise. The 6Ds of Solution Fluency are an essential system for strong critical thinking and gaining transferable tools and strategies to apply to any problem solving or creative task. In this workshop you will learn these tools and strategies by tackling the redesign of an outdoor space. We have no doubt that your green thumbs, great ideas, and critical and creative thinking will surely spark some innovative solutions. Handouts will be available for all teachers so you can apply this back at your school!

**Suitable for Year 4 to 8 students and teachers**

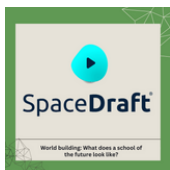


## Building Bridges

**Clough Group**

Bridges are fascinating feats of engineering. Throughout history, humans have creatively designed everything from rope and plank bridges to the Sydney Harbour Bridge. Today, primarily civil and structural engineers are responsible for the design of bridges. Since bridges must be safe under all anticipated load and weather conditions, in designing today's modern bridges, engineers take into consideration tension and compression forces. They also creatively strive to meet people's needs within budget and material constraints. In this problem solver workshop you will be challenged to build the strongest bridge, which meets the client's requirements. You will designate roles in your team (newly created company), plan, design, shop, build, test, and evaluate! Learn what it is to be a real world construction engineer!

**Suitable for Year 7 to 10 students and teachers**



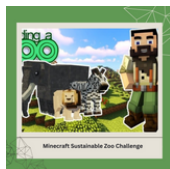
## World building: What does a school of the future look like?

**SpaceDraft**

SpaceDraft is a collaborative visual communication tool that helps people see the same story for any virtual or physical world over time. It can help to creatively communicate an idea, map out what's in your head so that anyone can understand exactly what you need them to know, and bring your ideas to life from every angle with sound, words, graphics and movement.

In this problem-solving workshop, you will learn how to use SpaceDraft to create and share ideas for what spaces in a school look like over time and in the future. Bring your dreams to life!

**Suitable for Year 4 to 10 students and teachers**



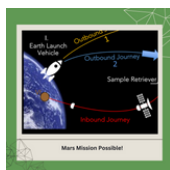
## Minecraft Sustainable Zoo Challenge

**Natascha Clark, Peter Carnley Anglican Community School**

Minecraft is a game-based learning platform that prepares you for a digital future while promoting creativity, collaboration and problem-solving in an immersive digital environment.

In this Problem Solver session you will enter the challenging world of Minecraft and create a sustainable inner city zoo. Complete challenges to win resources to complete your city zoo.

**Suitable for Year 5 to 10 students and teachers**



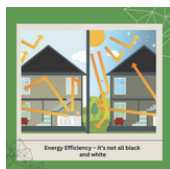
## Mars Mission Possible!

**Engineers Australia**

Your team gets an encrypted message and it's NASA with a mission for you to accept. **You only have one shot to get a sample from the surface of Mars!**

How is this amazing feat of engineering going to happen? How to get to Mars? How to get the sample? How to communicate to Earth? How to stay alive? How to stay safe? Questions that your engineering ingenuity can help to answer! In this workshop, you will explore the different systems needed and how they will interact and connect with each other to bring this mission to life. Using a systems engineering approach, let's uncover your engineering talents through curiosity and creativity. Prepare to journey into the unknown!

**Suitable for Year 6 to 10 students and teachers**



## Energy Efficiency – it's not all black and white

**Tronox**

Energy efficiency is critical to solving the climate crisis. In most cases, efficiency measures have proven to be the most cost-effective way to address climate change while reducing energy waste, saving money, and affordably expanding the use of renewable energy resources. However it is not all black and white. In this 80min hands-on workshop you will discover how improving the reflective nature of rooms and buildings can make a huge difference to energy efficiency. Even better, you will discover how leading edge technology using Titanium Dioxide can have benefits to the climate beyond reducing energy needs.

**Suitable for Year 7 to 10 students and teachers**



## Using Lego to Prototype & Test the New Swan River Bridge

**Chee Wong, E2 Young Engineers Australia**

Designing a bridge is not for the faint-hearted – it has life & death implications. The McGowan government is building a new \$100 million pedestrian & cyclist bridge alongside the existing causeway, separating path users from traffic. This will make it safer for all road users but it will have environmental and other implications. You are part of the design team investigating and evaluating various design ideas. You have your teammates, a tray of Lego and your brilliant self to prototype and test the various design ideas.

**Suitable for Year 4 to 8 students and teachers**



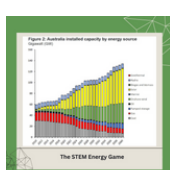
## Binar 'bots: Communications and Space

**Curtin STEM Outreach**

Curtin's micro-satellite program is a game changer for WA. With smaller payloads, agile communication and low-cost launches, these next-gen satellites are allowing WA to leapfrog into space.

In this workshop you will use your coding, problem solving and critical thinking skills to program Lego mini-bots to complete planetary science satellite missions.

**Suitable for Year 7 to 10 students and teachers**



## The STEM Energy Game

**Woodside Energy Ltd**

Climate change is one of the largest challenges countries and all of us face as we progress through this century. Different states and countries use a variety of energy sources (coal, gas, solar, wind, hydro, nuclear, tidal, etc) to make up their energy mix. As we move into the future and want to avoid irreversible climate change these energy mixes need to change to lower greenhouse gas emissions, but at the same time supply the ever increasing demand for power. In this problem solver session you will participate in a game that shows how an energy mix can vary from 2025 to 2050, based on choices your team makes, events which happen and a bit of luck. Teams will play as different states or countries and discover how the complexities of building new energy, removing others, and transitioning in-between changes over time as technology evolves and ending contracts gets cheaper.

To win the game you have to follow the rules, spend your money wisely and focus on three areas:

1. Reduce the carbon intensity of your electricity grid
2. Grow the electricity grid in line with the goal your team receives in 2025
3. Ensure your energy mix meets minimum requirements your team receives in 2050

**Suitable for Year 7 to 10 students and teachers**

## Flow of the day....

\*Listed program is subject to change

- 8.15am Sign-in, coffee and networking
- 8.45am Master of Ceremonies - Welcome, set up for the day and housekeeping
- 9.00am **KEYNOTE SPEAKER: DR JESSICA BUCK**  
Telethon Kids Institute and UWA Researcher and Superstar of STEM
- 9.40am **ROTATION ONE - 40 min parallel sessions**  
>> Teacher Mini-Master Classes  
>> Student and/or Teacher DigiDesign Mini-workshops and STEM Expo
- 10.25am **MORNING TEA** - An opportunity to network with other teachers and students, and explore EXPO
- 11.00am **PROBLEM SOLVERS DESIGN CHALLENGE**  
>> 80 min session - parallel sessions aimed at Year 4 to 10 students and teachers. This session is an opportunity for universities, industry, schools or community organizations' to pose real life design challenges and lead students through the design process to ideate and present possible solutions.  
**TEACHER ALTERNATE SESSIONS**
- 11.00am >> 40 min Teacher Networking STEM Pathways session: Opportunity to connect with other teachers and presenters to share ideas, possibilities and practices
- 11.40am >> 40 min STEM Pathways session: Opportunity to meet with the sponsors in the STEM EXPO area to discuss (without students) how they can support you in delivering and inspiring STEM in your school.
- 12.25pm **LUNCH** - An opportunity to network with other teachers and students, and explore EXPO
- 1.00pm **KEYNOTE SPEAKER: RENAE SAYERS**  
Space Science and Technology Centre, School of Earth and Planetary Sciences, Curtin University
- 1.40pm **ROTATION TWO - 40 min parallel sessions**  
>> Teacher Mini-Master Classes  
>> Student and/or Teacher DigiDesign Mini-workshops and STEM Expo
- 2.30pm **FEEDBACK AND CONFERENCE COMPLETION**  
>> Awarding of prizes to attendees  
>> Completion of feedback form
- 2.45pm **CLOSE OF THE CONFERENCE**



**Wednesday, 20 September 2023**

**Begins: 8.45am**

**Concludes: 2.45pm**

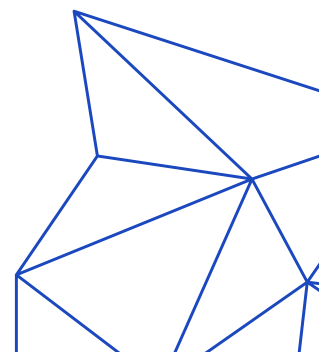
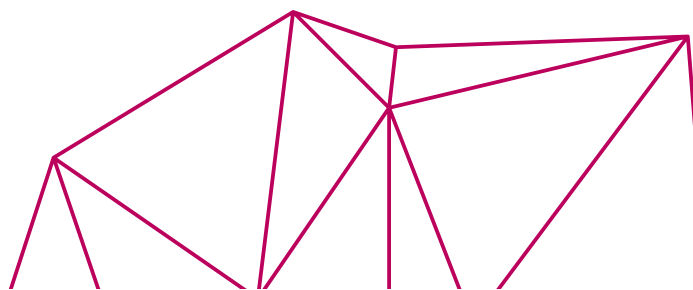
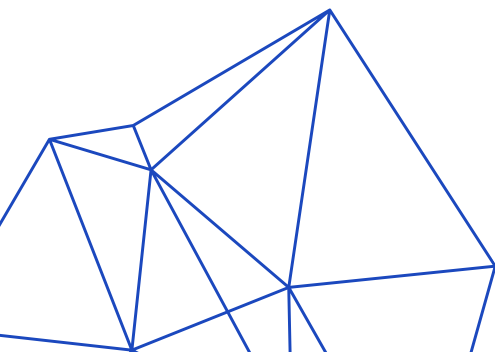
**(Doors open for sign-in 8.15am)**

**Venue: Peter Carnley Anglican Community School**

**386 Wellard St**

**Wellard WA 6170**

**includes Morning tea and Lunch**



# Thank you to our Sponsors

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### Conference Coordinator



### Host School



[REGISTRATION: spark-educonferences.com.au/wa-2023-registration/](https://spark-educonferences.com.au/wa-2023-registration/)

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